

# Revenue Management



A Practical Pricing Perspective

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Edited by Ian Yeoman and  
Una McMahon-Beattie



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*To the daftest cat in the world, who recently passed away.*  
*Ian Yeoman*

*To Graham, James and Lucy for keeping me sane.*  
*Una McMahon-Beattie*

*To Dr Anthony Ingold, who inspired us to write the first book and  
continues to inspire us today and into the future*  
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# Forewords

## **Kevin Connor, Vice President, DHL Express, Long Time Revenue Management Cheerleader**

Over the past two decades, companies of all sizes poured billions of dollars into enterprise reporting and costing systems. Names such as SAP and Oracle became commonplace and for good reason – their systems allowed companies to substantially grow profit margins by creating a whole new level of visibility and control over costs.

Concurrently, a handful of companies and universities began work on enterprise Pricing and Revenue Management. Through use of data analysis and science, these organizations reported preliminary gains of 2–4 margin points, with benefits tripling during the next decade. For companies such as legacy airlines, the Revenue Management contributions represented the difference between financial viability and extinction.

Curiously, the majority of companies that achieved significant benefits from enterprise cost management largely avoided making similar investments in Pricing and Revenue Management. When questioned, companies typically explain the gap as follows – “while costs are clearly visible, measuring lost revenue opportunities is more difficult”. Many businesses naively rationalize that their business situation is “unique” and does not fit well with Revenue Management practices.

If you are or have been involved in establishing a Pricing and Revenue Management function, the corporate “inertia” described above probably sounds familiar. However difficult your situation, rest assured that Revenue Management practices are applicable in every business. While true that some of the most evolved Revenue Management applications can be esoteric, the basic steps – documenting beliefs, test business rules, measuring results and continually iterating rules – are fairly straightforward and will produce the majority of the benefit of highly complex solutions. This book will provide the readers with perspective about how others have overcome their own corporate “inertia”.

Over the past five years, the Pricing and Revenue Management movement has finally picked up momentum in many new industries. You now find corporate financial reports prominently crediting “improved Pricing and Revenue Management” for improved results at pharmaceutical distributors, radio and television stations, banks, small package companies, cable companies and theme parks with many attributing \$100 plus million gains to their Revenue Management efforts. One thing to note: if the gains by your competitors don’t excite your management team, consider that several Revenue

Management studies have found that good Revenue Management results come in part at the expense of the competition!

Ian Yeoman and Una McMahon-Beattie are recognized subject matter experts in the field of Pricing and Revenue Management. They have created this book to help pricing managers from all industries understand the practical components of successful Pricing and Revenue Management and, more importantly, help readers generate their own thoughts on how the enclosed “lessons learned” might apply to their particular business situation.

The book is a compilation of experiences gathered from more than a dozen leading practitioners of Pricing and Revenue Management. The “case study” format of the book is organized around those common platforms faced by pricing organizations – foundational requirements, organizational issues, customer/marketplace considerations and technology – and concluding with real life stories as told by the project leaders of successful Revenue Management start-ups in new business segments.

This book will serve as an invaluable reference for those Pricing and Revenue Management practitioners looking for inspiration on how to improve their organization’s financial performance and competitive standing through better pricing practices. Our hope is that after reading this book, you will be further inspired to push the Revenue Management revolution within your company, moving it from a back office function to an enterprise-wide strategic function, integrated into all parts of your organization’s planning processes.

**Robert G. Cross, Chairman and CEO, Revenue Analytics, Inc.  
and Author, *Revenue Management, Hard-core Tactics for  
Market Domination***

Revenue Management originated as a means to manage discount seat allocations to help avoid deadly price wars looming after airline deregulation. Bob Crandall, then CEO of American Airlines, famously said that this discipline “is the single most important technical development in transportation management since we entered the era of airline deregulation in 1979”.

These concepts have become indispensable for airlines, hotels, cruise lines and other travel and transportation firms. Beyond those early adopters many other industries have begun to apply these notions in B2B as well as B2C environments with notable success. Industries as diverse as manufacturers, distributors and retailers frequently report 3–7 per cent increases in revenue upon adopting these techniques. Such revenue increases come from existing products and channels, so bottom line profit improvements of 40 to 50 per cent are not atypical.

The need for the accelerated learning and greater adoption has become more critical as businesses face growing transparency to both consumers and

competitors resulting in intensifying competition and downward pressure on price.

Business must strive to keep pace. Hidden opportunities exist for business to increase price. Additional demand can be stimulated by offering discounts with discretion. Uncovering the specifics of when, where and how much is no easy task.

Revenue Management can assist. Its proven techniques are perfectly aligned to help companies understand consumer demand and make more accurate and profitable decisions relative to inventory, pricing, procurement and merchandising. Revenue Management is evolving from merely an inventory control function to an integrated strategic capability.

Central to this evolution is the ability to collect, store and analyse each individual customer transaction in a comprehensive and rigorous framework. This enables companies to model customer behaviour at a granular level and accurately predict consumer response to price, taking into account competitor price positioning.

Knowing probable customer behaviour and linking that with variable costs enables revenues to be optimized and profits to be maximized. This knowledge is a low-risk source of growth and profitability for virtually any company as it can be applied to product pricing, discounting, negotiated deals, bulk sales, promotions or virtually any transaction in which a seller desires to improve its chances of converting a sale at the highest possible margin.

Resources to help are scant despite a growing number of papers and books devoted to the topic. The published material often falls into one of two categories. There are publications which offer high-level strategic vision or advice, but not necessarily practical application. On the other hand, research papers are available on statistical and mathematical approaches to the topic, but they may not be immediately useful to the practitioner.

This book seeks to close the gap between idea and execution.

Dr Yeoman and Dr Una McMahon-Beattie have done a splendid job in collecting writings from some of the world's leading experts in the field, and they have presented them in an accessible format. The book offers practical insights in taking this rapidly evolving discipline from concept to implementation leveraging the experience of academics and professionals. It should be a valuable resource and spark of inspiration and motivation for years to come.

**Richard Ratliff, Senior Research Scientist, Sabre Research**

The science and business processes of Pricing and Revenue Management became more sophisticated following airline industry deregulation; these

two related practices are becoming increasingly important for companies with perishable inventory that want to remain competitive in the e-commerce era. While the basic economic principle of matching customer demand and suppliers still remains true, modern Pricing and Revenue Management has grown in complexity for many reasons; for example, the ever-changing online marketplace, faster product time-to-market and lifecycles, fierce competition, new business models, more extensive distribution channels, and more sophisticated and demanding customers. Pricing and Revenue Management technology and business processes are evolving rapidly to meet these challenges, but it is often difficult for practitioners to keep up with new advances. This book touches on many different aspects of Pricing and Revenue Management and is intended to help bridge the gap between modern theory and practice.

The science of Revenue Management began about 30 years ago, and the core value propositions continue to be relevant today. In the 1980s, large-scale, global electronic marketplaces (known as Global Distribution Systems or GDS) were established in the travel industry, so in the 1990s, travel was well positioned for newly emerging online sales channels via the Internet. Today's travel consumers have nearly perfect information regarding air, car, hotel and cruise prices, so the industry is fiercely price competitive. Technologies such as demand forecasting, supply optimization, low fare search, product screen positioning, product cross-selling and competitive intelligence gathering have become vital for the success of travel companies. Revenue Management technologies are also gaining importance in other industries as more companies make their products and pricing available online.

Compared to Revenue Management, less progress has been made on decision support for product pricing. Consumers are well informed by use of travel agents and low fare search engines, and so to remain competitive in the marketplace, airlines often resort to straight price matching of competing airline offerings. An improvement to the price response process would consider quality of service differences across carriers (which can vary dramatically due to non-stop versus connections, departure times, elapsed flight times, carrier brand preferences and so on). Recent published examples show that customer choice models are proving useful for this purpose. Progress is also being made in areas such as Strategic Pricing, Dynamic Pricing and Game Theory applied to the travel industry.

Pricing and Revenue Management decision support tools are only effective when well integrated with a company's business processes. Systems alone cannot optimize revenue performance, but for those companies that are willing to modify their business practices to make use of the latest technologies, the gains are significant (often achieving 10 per cent plus improvements in profitability). Considerable advances have been made during the past decade

in decision support for areas such as online merchandising, incorporating demand dependencies into Revenue Management optimization, customer relationship management, customer shopping and purchasing behaviour, and group sales. The reader should find this book helpful for gaining a better appreciation of these opportunities and their application in practice.

# Introduction: How to do it?

*Ian Yeoman and Una McMahon-Beattie*

Any business must know its customers, specifically you need to know how much your customers will pay for a product and devise appropriate strategies. This is not about offering the lowest price in order to fill capacity. It's about knowing your market segment, how much they will pay, when they will purchase and what distribution channels they will use. Pricing is about deciding your market position, that is, premium or low cost, whereas Revenue Management is the strategic and tactical decisions firms take in order to optimize revenues and profits. Since the publication of Peter Belobaba's PhD thesis work, *Air Travel Demand and Airline Seat Inventory Management* (1987), which was a defining moment in the management of complexity, capacity allocation and real-time inventory solutions, Revenue Management has come of age, fuelled by superior management science models and greater accessibility to technology in addition to the acceptance of the guiding principle of Revenue Management in enhancing the bottom line. At the same time, society has shifted from manufacturing to a service industries economy where the unit of inventory is time, in which the consumer year on year is more price sensitive. Today, in the age of the Internet, the management time slots as inventory along with instant purchase is the foundation of many consumer products and services. Hence, Revenue Management has spawned across many industries and applications. This book is a collection of chapters by leading researchers, experts and practitioners aimed at those wishing to be briefed on the latest research and theories as well as the "how to" of Revenue Management, including academics and students of price management and managers from an operations and unit level within constrained capacity service industries such as hotels, restaurants and airlines. The book is supported by a series of audio and power point presentations at Henry Stewart Talks (<http://www.hstalks.com>) under the series title of "Practical Pricing and Revenue Management".

The book chapters can be read individually or in chronological order, but please remember that this book has been written by a range of individuals with different backgrounds and industries – the style of writing varies

from chapter to chapter. However, all of the chapters are authoritative and accessible to both a layperson or seasoned veteran.

### Part I – Revenue Management theory and issues

The first part of the book tells the reader what Revenue Management is, management implications and issues, thus providing a comprehensive understanding of where Revenue Management is today and many of the contemporary challenges facing a variety of different industries grappling with implementation and management. In chapter 1, Catherine Cleophas and colleagues provide an overview of how Revenue Management is applied in different industries, which sets the scene for forthcoming chapters in the book. In chapter 2, Sheryl Kimes and Leo Renaghan explore the issue of managing space, the central component of inventory across all industries. The authors argue that if companies do not properly consider the configuration and ambience of their space, they are destined to sub-optimal revenue performance regardless of how effectively they manage price and time. Warren Lieberman of Veritec Solutions in chapter 3 writes about the impacts of staff effectiveness and the strategies and tactics that can be adopted. The chapter provides an overview of key organizational challenges faced when implementing pricing and revenue optimization programmes and identifies strategies and tactics that can increase the success of such efforts.

Traditional Revenue Management systems are excellent at maximizing revenue at flight level; they do not consider long-term relationship values and costs when making inventory decisions according to Ramesh Venkat of Emirates Airline in chapter 4. There is a need to develop models based on enterprise value than just price and inventory. This can be done by including cost and relationship values to maximize profitability. Future Revenue Management systems need to be proactive and embrace emerging pricing models with an operating time range that covers the whole financial planning period. Integrating Revenue Management with marketing, pricing and distribution represents a move from traditional Revenue Management to profit optimization. Una McMahon-Beattie argues in chapter 5 that trust is at the heart of relationship marketing strategies, and therefore there would appear to be a potential conflict between the aims of relationship marketing/customer relationship management and Revenue Management. This chapter therefore investigates the importance of consumer trust in Revenue Management and explores the ways in which trust can be utilized in developing and maintaining effective relationships with customers. In particular, it is suggested that consumers' level of knowledge of the "rules" in which variable pricing operates may well cause trust/distrust. In chapter 6 Ian Yeoman explores and sets out to describe the evolution of luxury and how consumers' attitudes and behaviours have changed. The chapter concludes with a discussion on the implications for premier priced goods and services.

In chapter 7, Ben Vinod of Sabre Technologies embraces the concepts of change, evolution to describe what is coming next, explaining how pricing and Revenue Management have transformed to make real-time decisions based on competitive market conditions. Product distribution through travel agencies continues to dominate the managed travel corporate landscape, while online travel agencies and supplier websites have made significant inroads in pursuit of the leisure business. Investment in merchandising branded fare products and ancillary services is a focus area for all aspects of the travel value chain, including pricing, Revenue Management and distribution. New innovations are also on the horizon with mobile applications and corporate collaboration tools to control travel spend. While the fundamental core value propositions have not changed, this chapter discusses changes in technology, the competitive landscape, and the future of Revenue Management and distribution.

Chapter 8, authored by Karl Isler of Swiss International Airlines, describes how Airline Revenue Management has changed over the last years, influenced by the advent of Internet distribution and Global Distribution Systems (GDS) functions like Origin and Destination (OD) control and seamless availability. The increased ability to price discriminate is seen as the main driver behind those changes. The author analyses current GDS functionality under this aspect and describes how it can be used to implement dynamic pricing, similar to the possibilities of the Internet. Further shortcomings of current GDS distribution and solutions proposed to improve the current capabilities are presented.

Jon Higbie of Revenues Analytics in chapter 9 gives a high-level overview of the analytic processes supporting B2B pricing and an introductory treatment of how to implement critical models. The author attempts to balance the treatment of business considerations with technical details of the underlying models. The intended audience includes practitioners searching for a deeper understanding of the requisite models and researchers seeking knowledge of the business context and current state of practice of B2B price optimization. Several real-world applications of B2B price optimization and key implementation issues are also discussed. The rest of the chapter demonstrates the three core models of the B2B pricing analytic process – the market response model, the contribution model and price optimization.

In chapter 10, Michael Zhang presents a general picture of fencing in the world of Revenue Management and discusses business issues related to the segmentation process and segmentation enforcement. The author then provides a survey of segmentation variables and uses them to develop the discussion of the corresponding fences in the practice of Revenue Management. A categorization of fences based on purchase patterns, product characteristics and customer characteristics is discussed and how fencing works in practice.



## Part II – Applications

The second part of the book explores and demonstrates how Revenue Management works in different industries. Özgür Özlük in chapter 11 describes the evolution of search-based advertising and Revenue Management. In 2009, search engine advertising made up 47 percent of the online advertising revenue which totalled \$10.9 billion. In this highly lucrative and visible branch of advertising, both publishers and advertisers put their best effort forward to utilize the system as efficiently as possible. In this chapter, the author discusses the Revenue Management questions faced in online advertising from both the publisher's and the advertiser's perspective. In Chapter 12, Raja Kasilingam presents the important differences between airline passenger Revenue Management and air cargo Revenue Management, from data requirements to implementation aspects.

In chapter 13, Warren Lieberman provides an overview of some of the key ways that hotels have been able to increase their revenues and profits through improved pricing, with illustrations of why these new approaches have been so financially important. In chapter 14, Stefan Poelt of Lufthansa Airlines focuses on practical aspects of airline pricing and Revenue Management from a network carrier's point of view. Beside the basic concepts of market segmentation, demand forecasting, overbooking and availability optimization, two main developments, from leg- to network-based Revenue Management and from independent to dependent demand structures are also described. As an example of airline-specific challenges some restrictions of legacy systems used in global distribution channels are mentioned. It is pointed out that most Revenue Management developments can be seen in the light of removing or relaxing wrong assumptions on which the first leg optimization methods have been based on.

Jiang Wang in chapter 15 addresses Revenue Management and optimal rents for apartments' letting starting with an introduction of the basic concepts in the apartment industry, followed by a description of a methodology by which the optimal rents can be derived. It then outlines the procedure for setting optimal rents, followed by an illustration with a case study. Finally, it concludes with the implication of this procedure in the practical application of Revenue Management for apartment operators. In chapter 16, Sunmee Choi addresses pricing in the restaurant business. In order to maximize revenue (or contribution), restaurant managers need to complement their traditional cost-driven pricing approaches with market-driven Revenue Management pricing approaches. Further, the traditional understanding of what restaurants sell and what constrains restaurants from producing more revenue needs to be refreshed and reflected in pricing policies. This chapter presents menu pricing and selling strategies from Revenue Management perspectives. Specifically, this chapter discusses concepts and examples of Revenue Management-driven pricing strategies such as optimal pricing

(charging the optimal price in consideration of its impact on consumer choices), variable pricing (varying prices charged to different customers) and menu re-engineering (menu engineering in consideration of the third component of “time”). Finally, presented and discussed are selling strategies differentiated by the type of time period (busy or slow periods).

In chapter 17, José Guadix demonstrates how Revenue Management can be used in the carparking industries, highlighting issues and presenting an appropriate model. To conclude, in Chapter 18, Lila Rasekh and Yihua Li of Walt Disney World state the goal of the golf course Revenue Management system is to maximize the profits by developing the best reservation policy for each available tee time. This research is based on an analysis of golf course tee-time reservation practice. Specifically, this chapter presents a unique linear model that can be used to assign the demand to the available tee-times, and thus, maximize their utilization and the total revenue. The linear model uses the forecasted demand data. The model is solved by using the SAS-OR build-in branch and bound algorithm. To reduce the computational time, the authors propose a heuristic to find an initial feasible solution to the model. This initial solution reduces the CPU time substantially and enabled them to solve the larger scale problem by using the SAS-OR.

Overall, 18 chapters of wondrous knowledge about Revenue Management which is presented in an accessible, authentic and knowledgeable manner. Enjoy!

## Reference

- Belobaba, P. P. (1987) *Air Travel Demand and Airline Seat Inventory Management*, PhD Thesis, Flight Transportation Laboratory, Massachusetts Institute of Technology, Cambridge, MA.

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# Part I

## Revenue Management Theory and Issues

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